

INVESTIGATOR'S ANNUAL REPORT

National Park Service

All or some of the information provided may be available to the public

Reporting Year: 2003	Park: Shenandoah NP
Principal Investigator: Dr L. Niel Plummer	Office Phone: 703-648-5841 Email: nplummer@usgs.gov
Address: U.S. Geological Survey 432 National Center Reston, VA 20192 US	Office Fax: 703-648-5832
Additional investigators or key field assistants (first name, last name, office phone, office email):	
Name: David Nelms Phone: 804-261-2630 Email: dlnelms@usgs.gov	
Permit#: SHEN-2000-SCI-0001	
Park-assigned Study Id. #: SHEN-00203	
Project Title: Dating of Ground Water in Shenandoah National Park	
Permit Start Date: Jan 01, 2000	Permit Expiration Date Jan 01, 2005
Study Start Date: Jan 01, 2000	Study End Date Jan 01, 2005
Study Status: Continuing	
Activity Type: Research	
Subject/Discipline: Water / Hydrology	
Objectives: <p>The overall objective of this work is to provide new information on the age and residence time of groundwater that discharges from springs in Shenandoah National Park. Measurements of a suite of environmental tracers are being used, including atmospheric chlorofluorocarbons (CFCs) and sulfur hexafluoride (SF6). It is expected that this work will have transfer value to dating of spring discharge, and interpretation of hydrochemical records of spring discharge. Specifically, we are looking at processes that affect the initial CFC and SF6 concentrations in the unsaturated zone. We are also using detailed records of thermal data to investigate the transient response of spring discharge to meteorological events.</p>	
Findings and Status: <p>Data collection continued in 2003 to further refine interpretation of groundwater age in SHEN and to improve understanding of temporal discharge from springs. The data collection includes the following: 1. Detailed temporal measurements of water temperature and specific conductance was recorded at 30-minute intervals in discharge from 5 springs in the Park, but ended in mid-September, 2003 at 4 of the 5 springs. We continue to record these data at Furnace spring where there is now a 60-month record at 30-minute intervals. 2. We are continuing full sampling (chemistry, isotopes, major dissolved gases, CFCs, SF6) at monthly intervals at these 5 springs. 3. We are recording water temperature at 30-minute intervals at approximately 30 springs in the Park. 4. We measured the composition of unsaturated-zone gases (CFCs, SF6, N2, Ar, CO2, O2) and unsaturated zone temperature in 6 unsaturated zone wells, through mid-September, 2003. This completed an approximate 2-year record of quarterly measurements of UZ gas composition. 6. We continue to analyze air collected approximately weekly at the Big Meadows Air Monitoring Station for CFCs and SF6. We continue to compile and evaluate these data.</p>	
For this study, were one or more specimens collected and removed from the park but not destroyed during analyses? No	
Funding provided this reporting year by NPS: 0	Funding provided this reporting year by other sources: 30000
Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or	

college	
Full name of college or university:	Annual funding provided by NPS to university or college this reporting year:
n/a	0